

# 2004

## A Record Year for Tornadoes

Dan McCarthy,  
Joe Schaefer and Greg Carbin  
NWS Storm Prediction Center



# Main Aspects of 2004

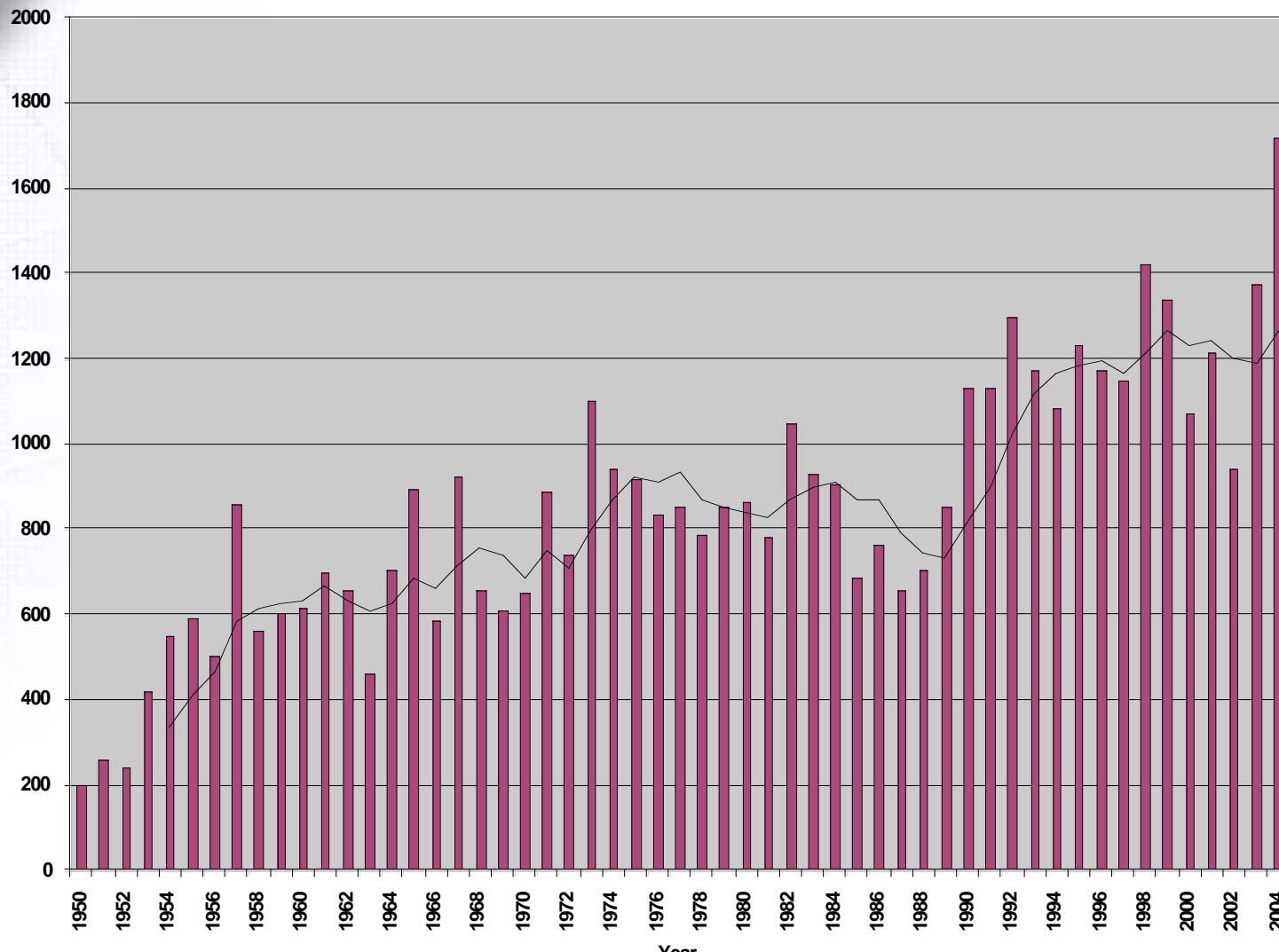
---

- Very slow start for tornadoes
  - Below normal through April
  - April highlight in Illinois
- Two-personality May
  - Unfavorable pattern through the 19<sup>th</sup>
  - Very favorable after the 20<sup>th</sup>
- A Tropical Storm and 5 Hurricanes
- Busy “second season”

***THIS LEAD TO 1,722 TORNADO REPORTS IN 2004***



# Tornadoes By Year

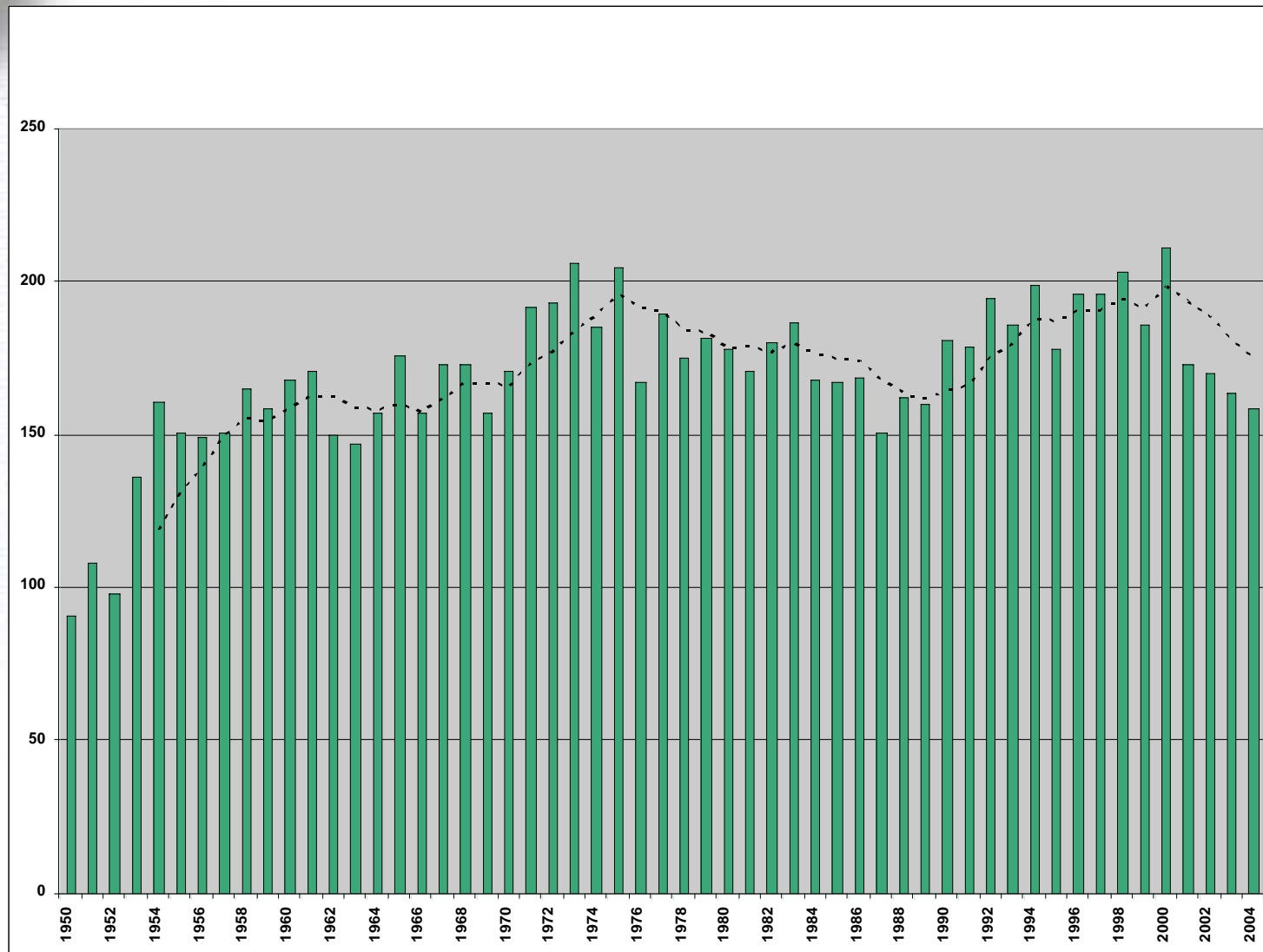


3/10/05

2005 National Severe Weather  
Workshop



# Tornado Days

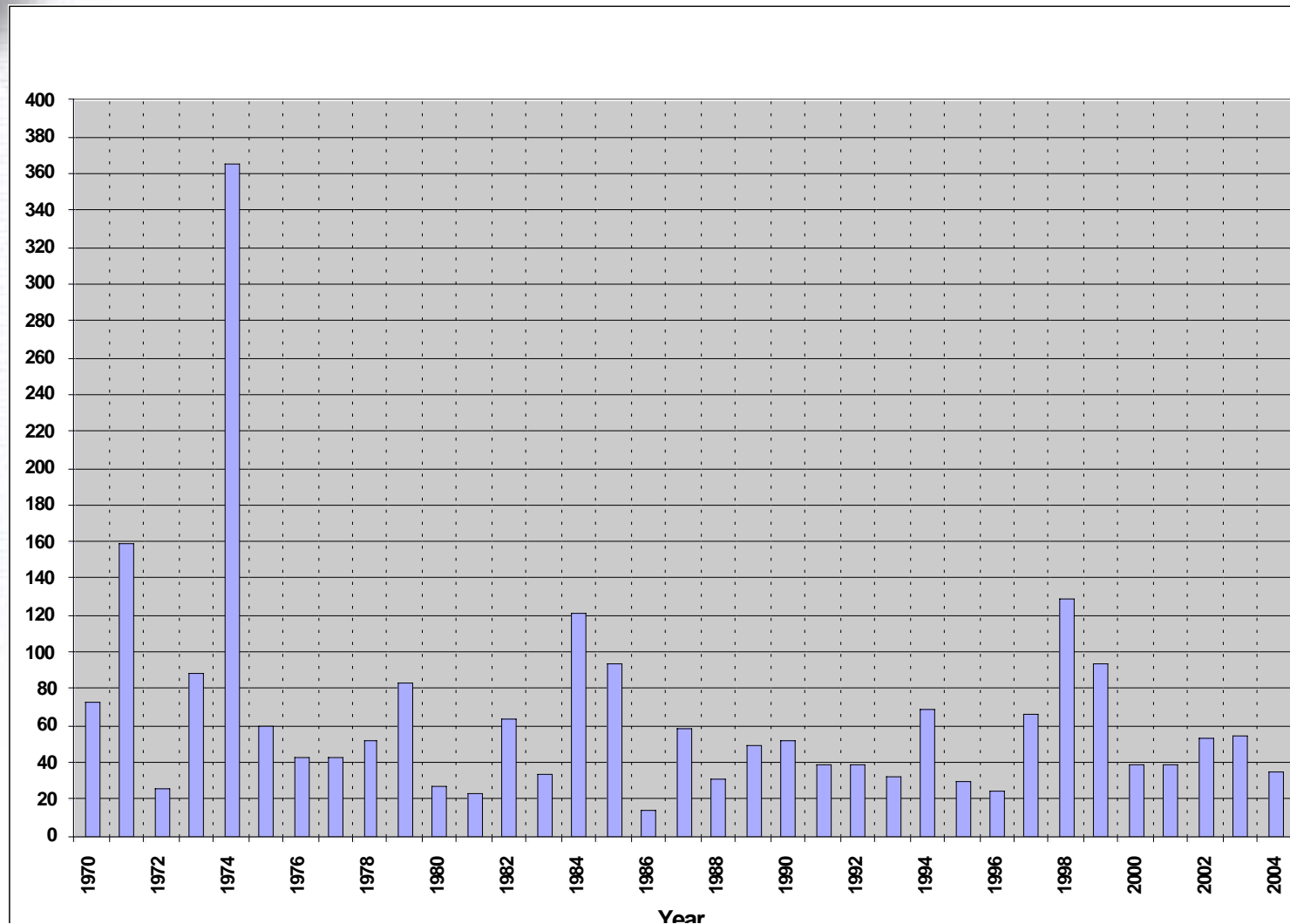


3/10/05

2005 National Severe Weather  
Workshop

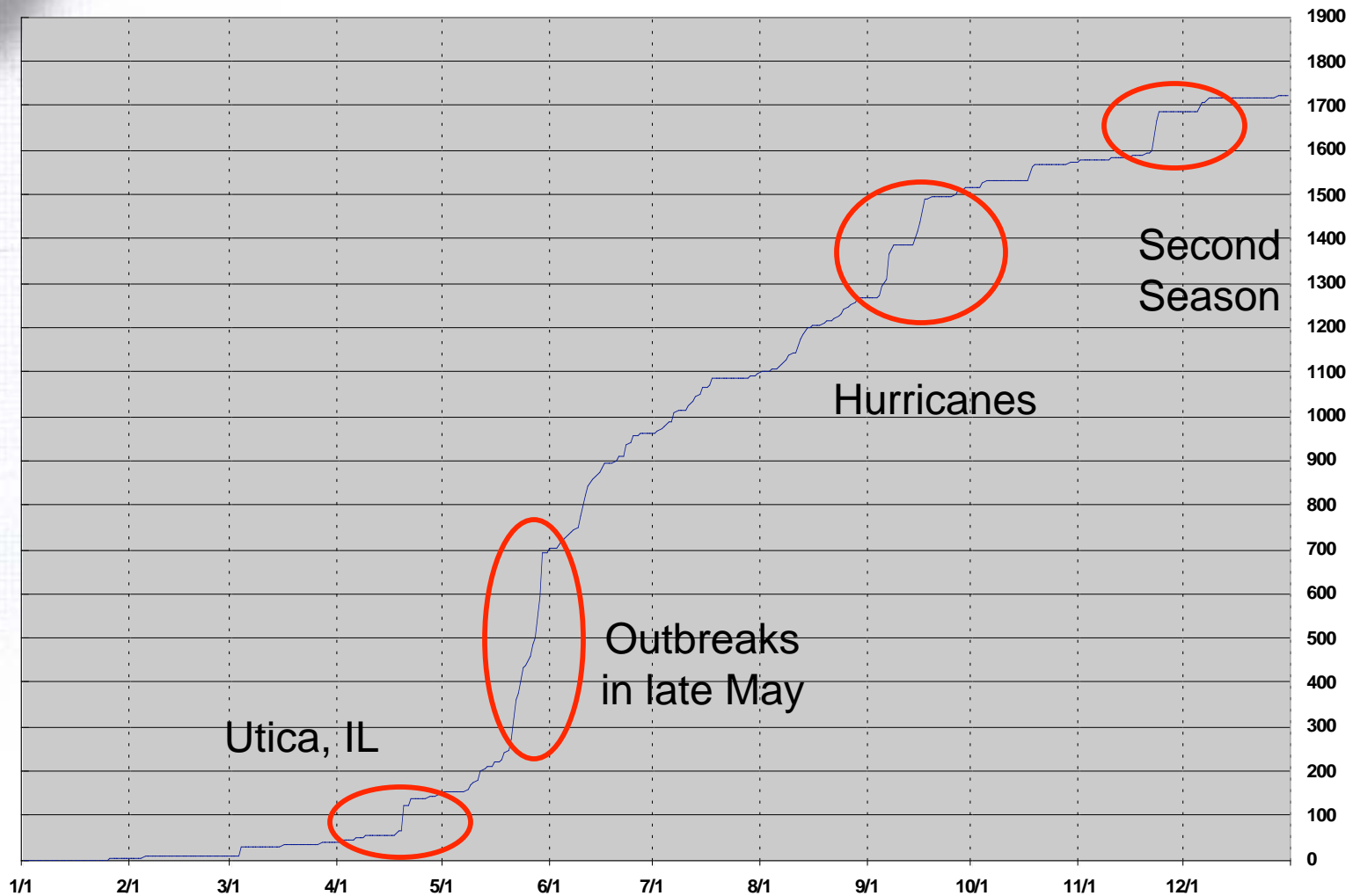


# Tornado Fatalities



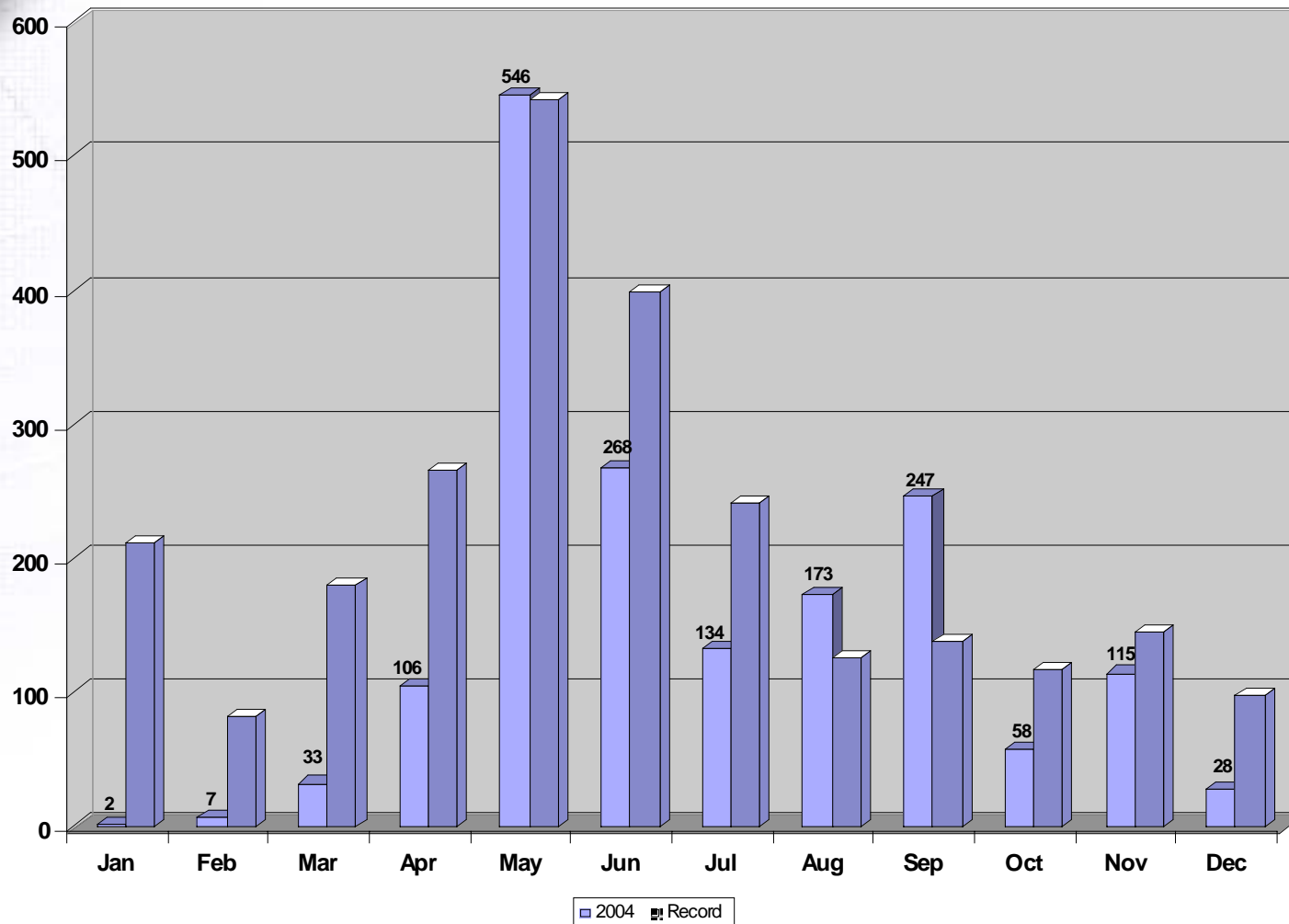


# 2004 Tornado Reports





# Tornadoes by Month



based on preliminary reports

3/10/05

2005 National Severe Weather  
Workshop





# Tornadoes in Hawaii

Interesting way to begin the Year





# Tornadoes near Oahu, HI



- Witnesses reported three tornadoes
- “funnels would start at the top, disappear and start again from the bottom.”
- Record for Hawaii is 5 tornadoes in 1971
- The 3 tornadoes on 1/23/04 ties 1982 for second highest

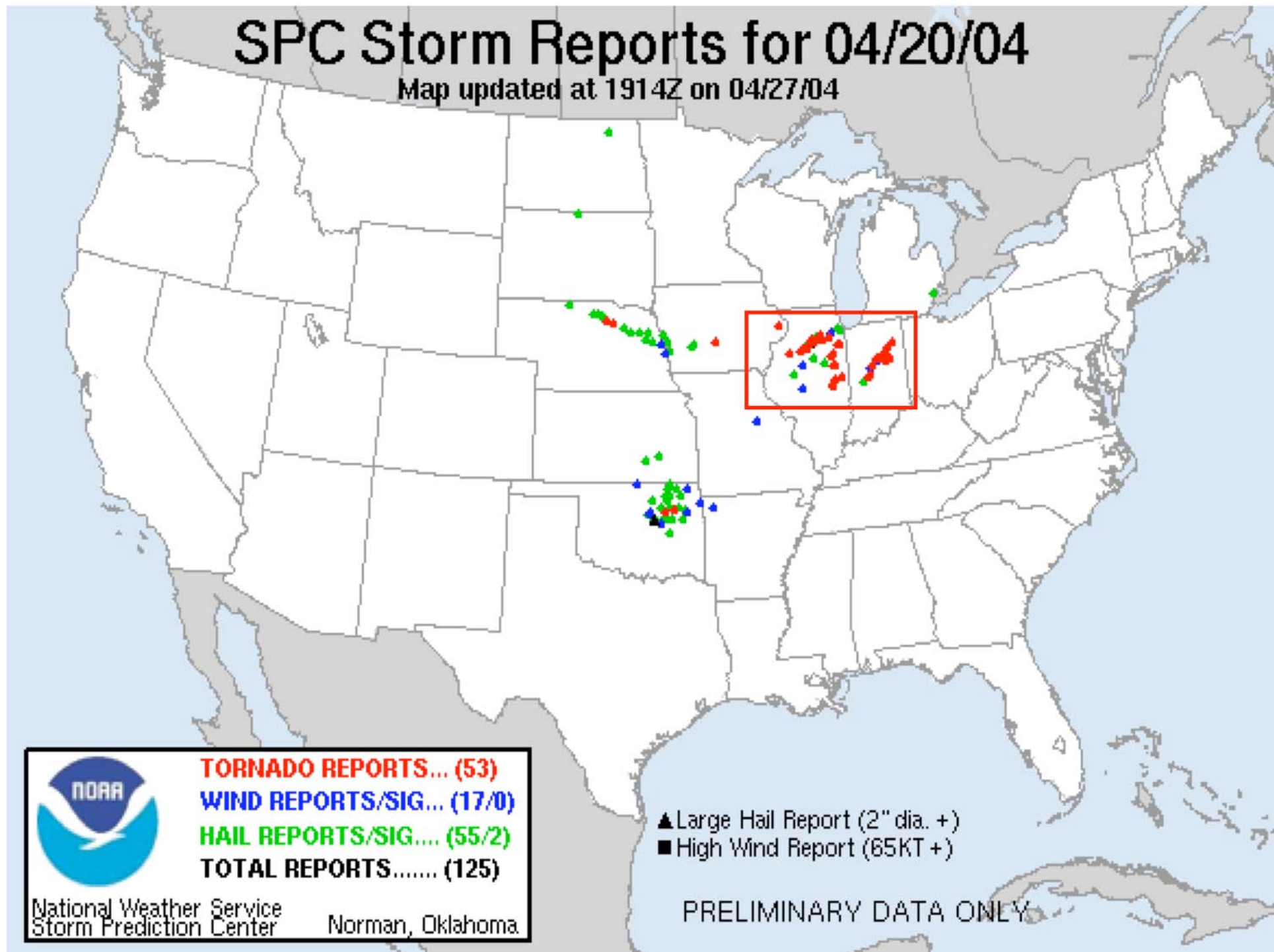


**April 20, 2004**

Utica, IL Tornado

# SPC Storm Reports for 04/20/04

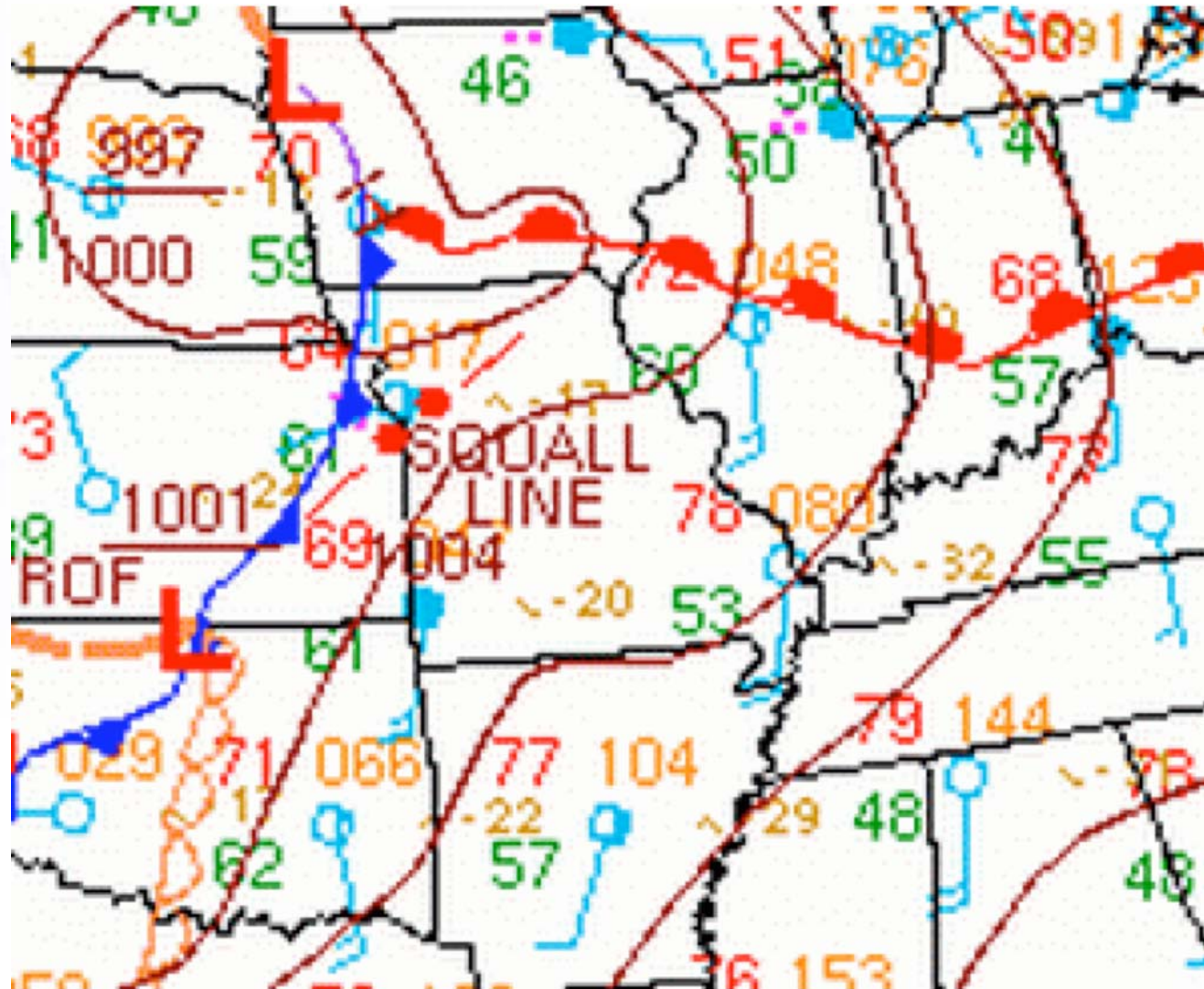
Map updated at 1914Z on 04/27/04







# Synoptic Set Up



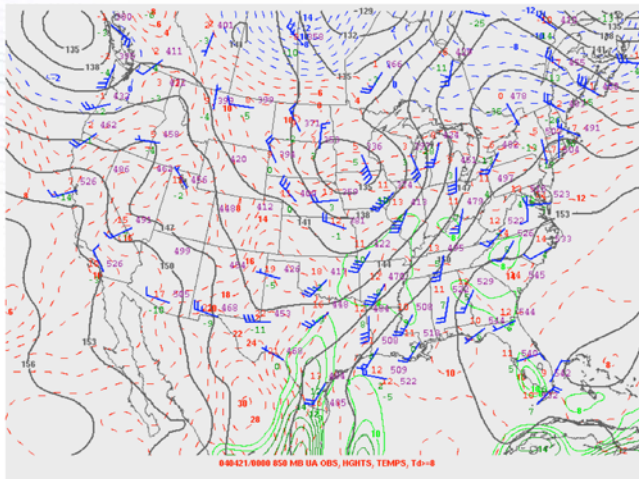
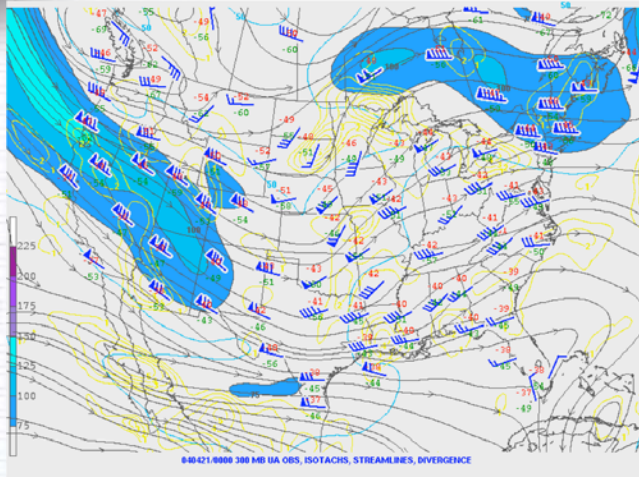
3/10/05

2005 National Severe Weather  
Workshop

12



# Upper Air

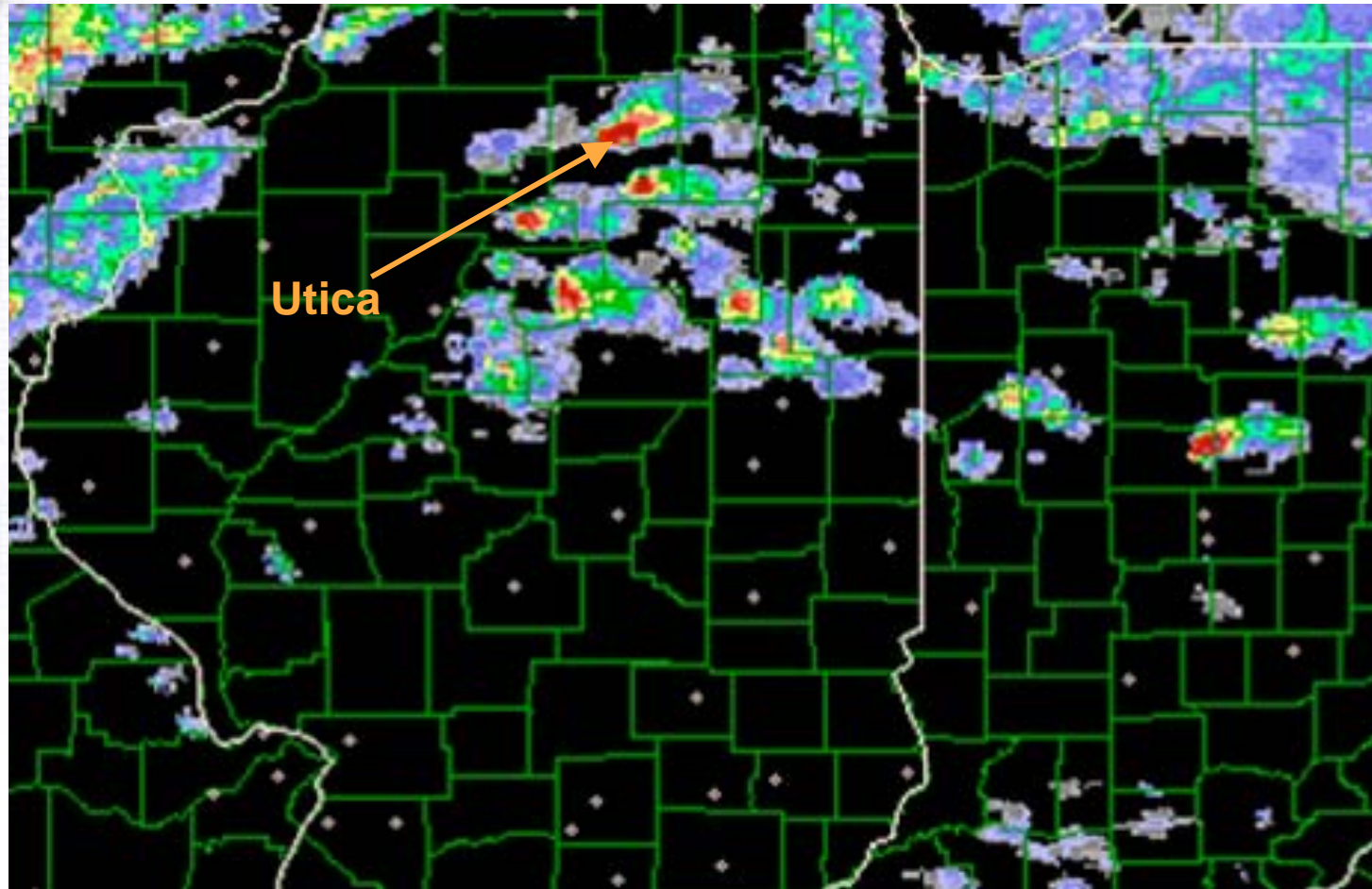


- Strong divergent flow at 250 mb
- Strong low level jet of 40-50 kt at 850 mb
- Low level jet across surface warm front provide strong ascent
- Upper level flow enhances vertical shear





# Central IL Radar at 2330 UTC







# Peru/Utica, IL Tornado



- 8 fatalities
- People took shelter in basement of Milestone Tap
- A structure that was 117 years old built of sandstone block and supported by railroad ties-type beams
- Damage was evaluated at F3 on F-Scale

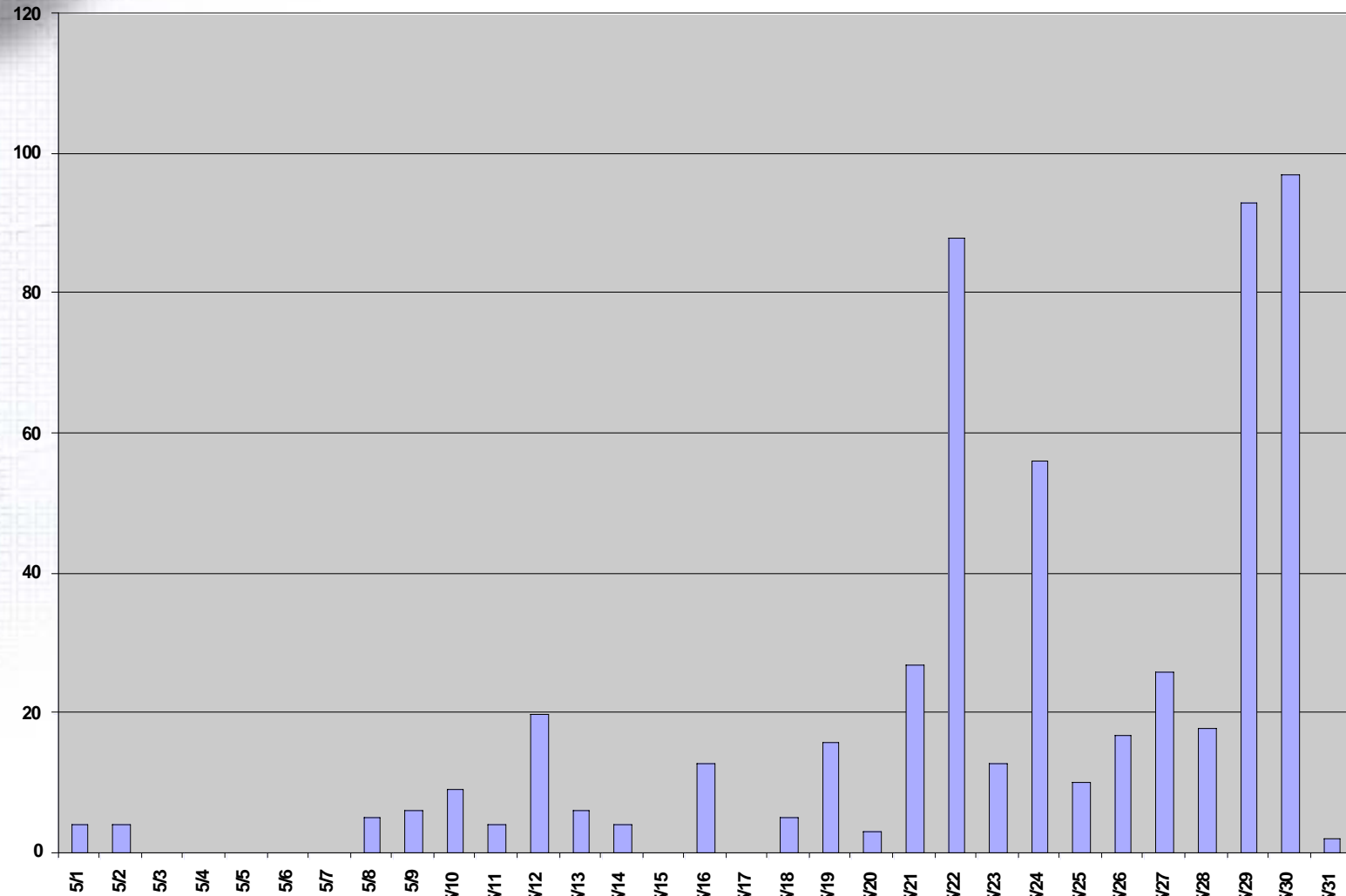


# May 2004

## The Tale of Two Seasons



# Quiet Start...Loud Finish



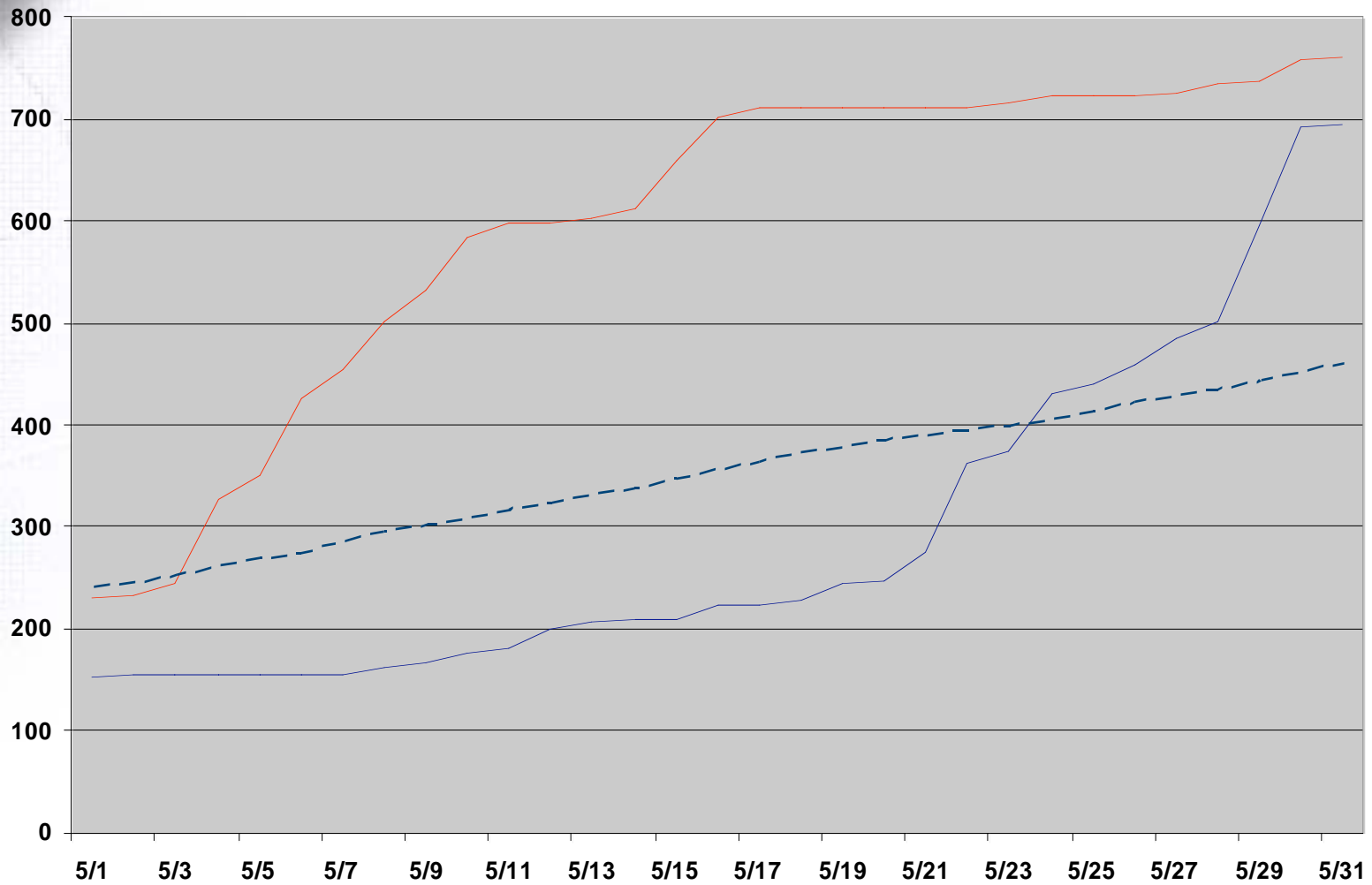
3/10/05

2005 National Severe Weather  
Workshop

17

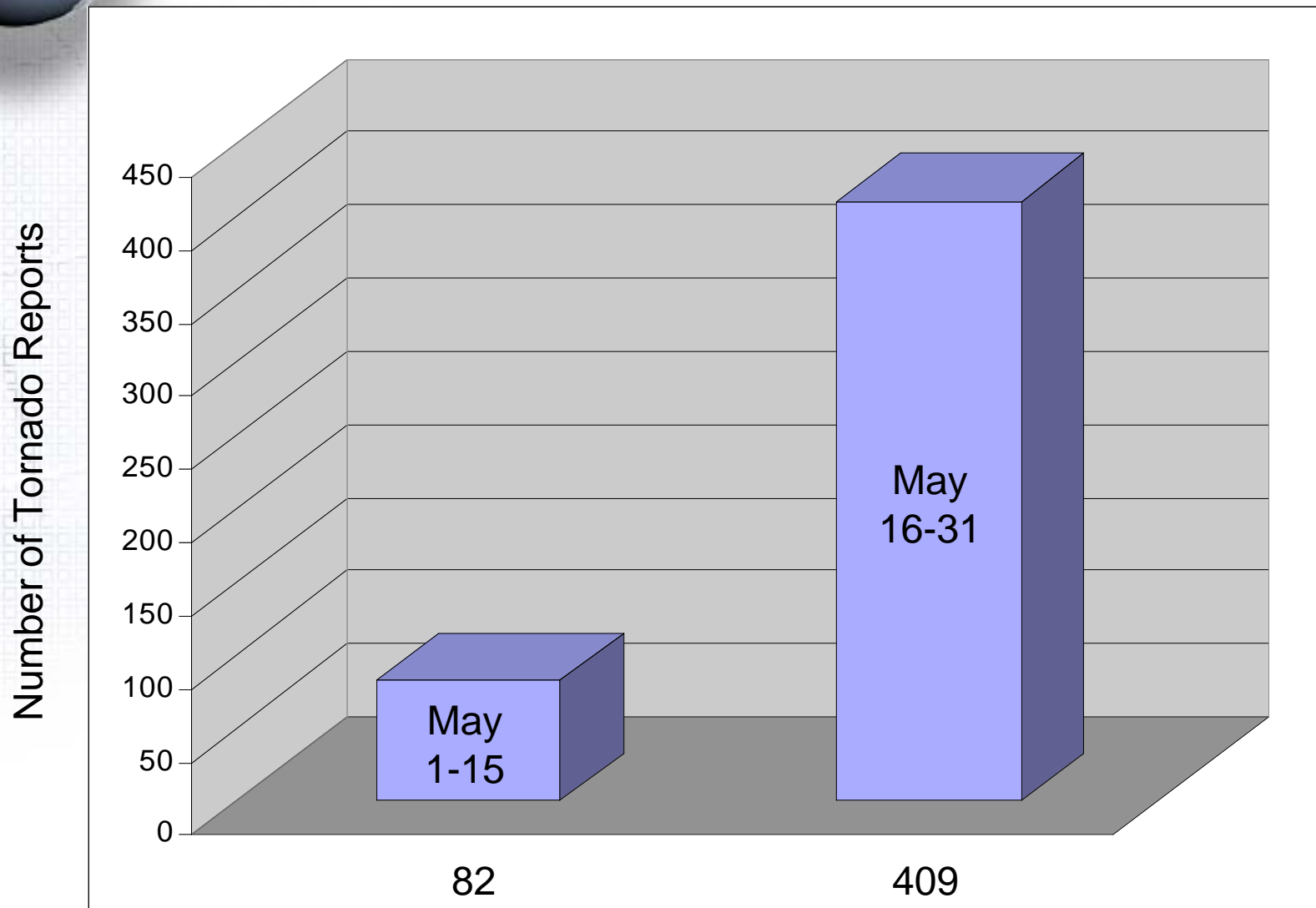


# In Another View...





# And Yet Another...



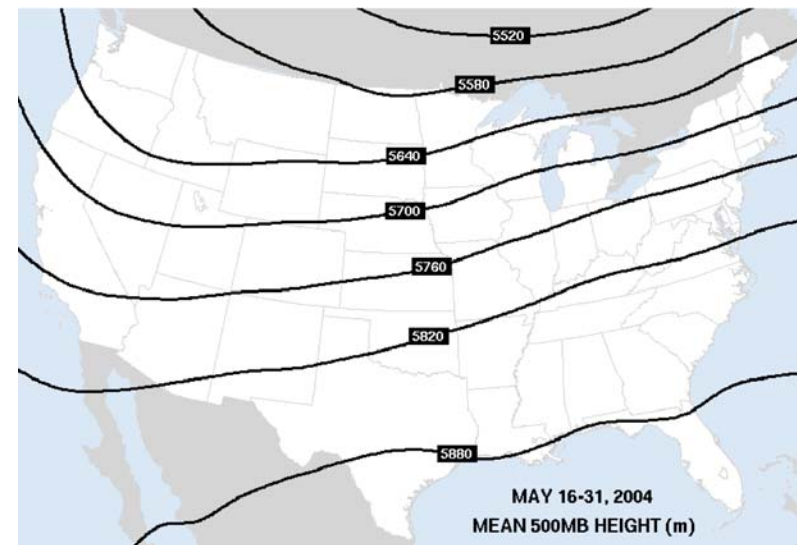
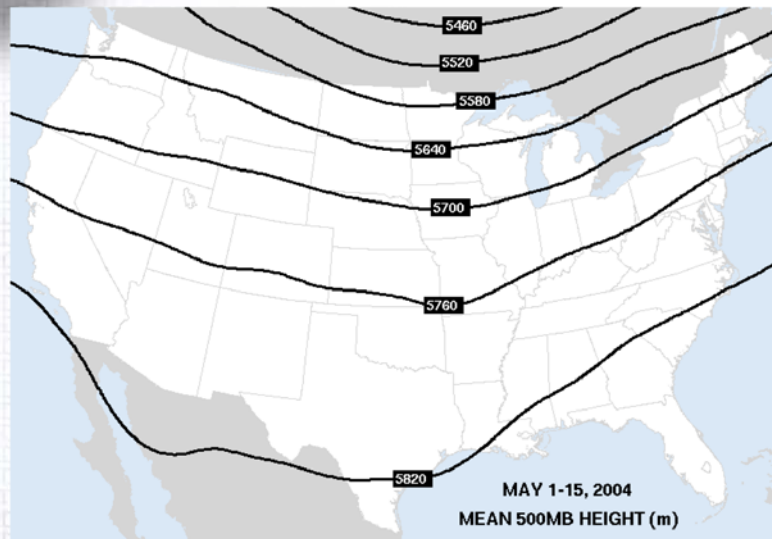
3/10/05

2005 National Severe Weather  
Workshop

19



# Changes at 500 mb...

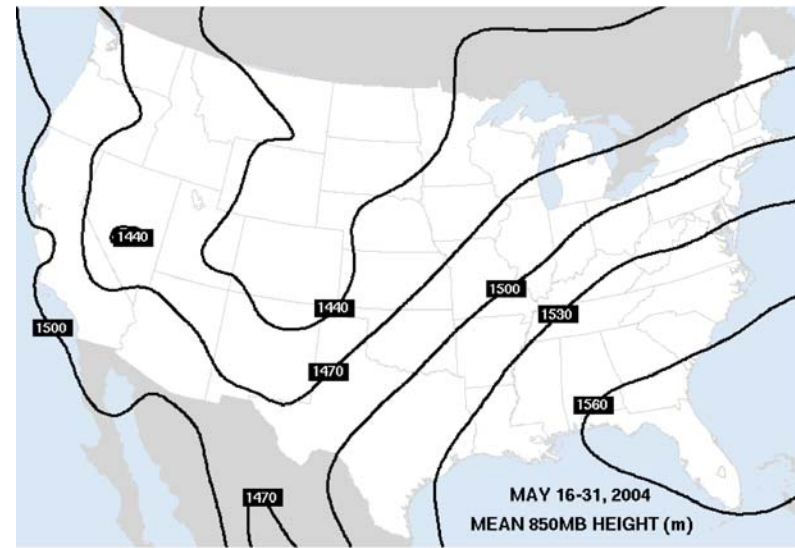
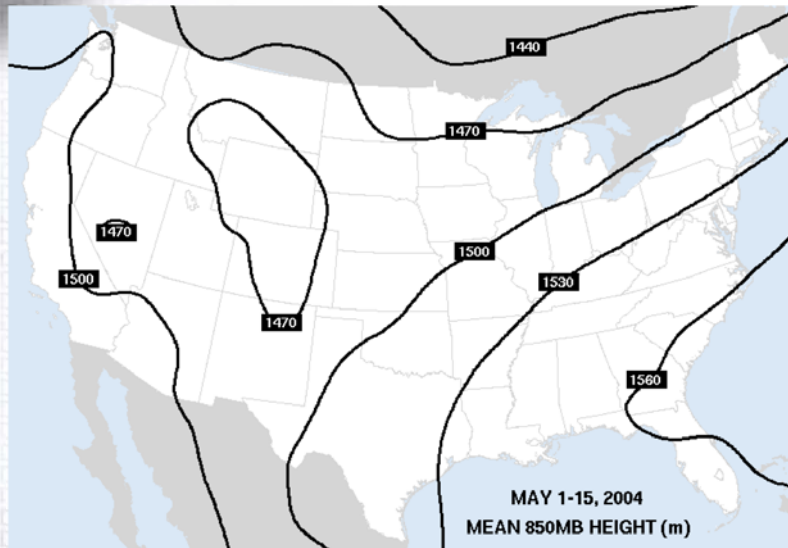


- Trough develops over the west
- Allows southwest flow across the Plains
- More favorable for severe weather





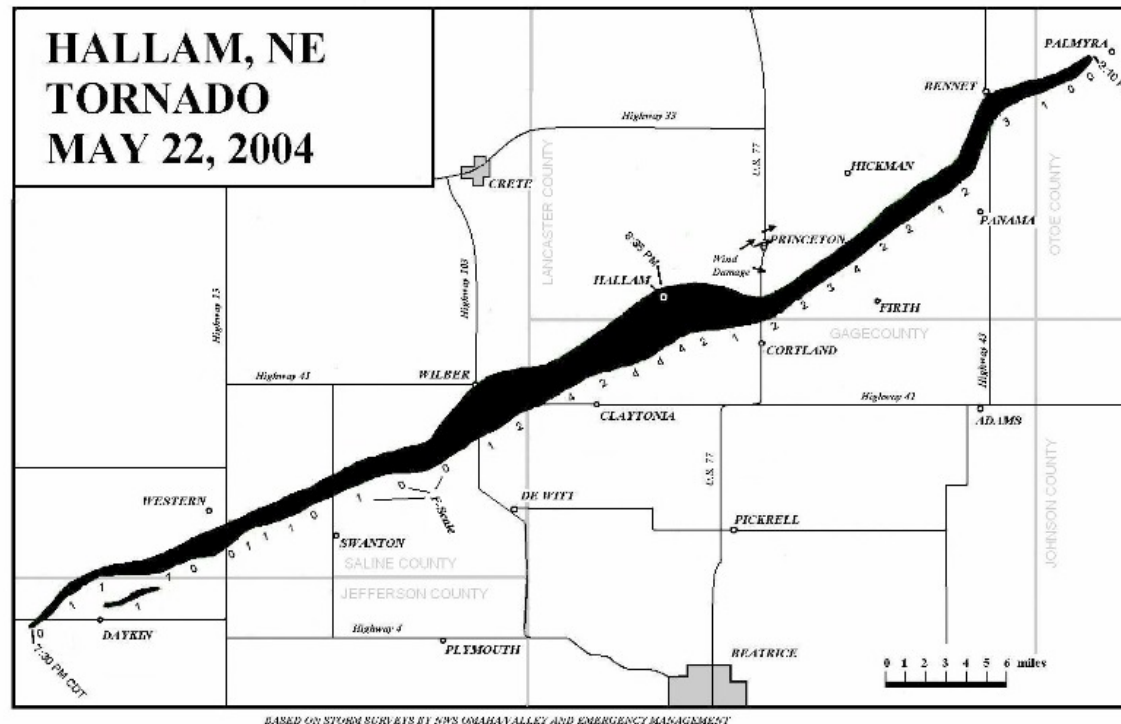
# Leads to Changes at 850 mb



- Began with ridging over Gulf of Mexico
  - Limiting low level moisture advection
- Changes to lower heights over Colorado
  - Western Gulf of Mexico opens up allowing moisture return



# May 22, 2004 – Hallam, NE



- Outbreak would include largest damage path on record
  - 2.5 mile wide maximum path width
  - Would cause F4 damage...and center of storm was south of town!!!



# Video of tornado near Daykin, NE

---



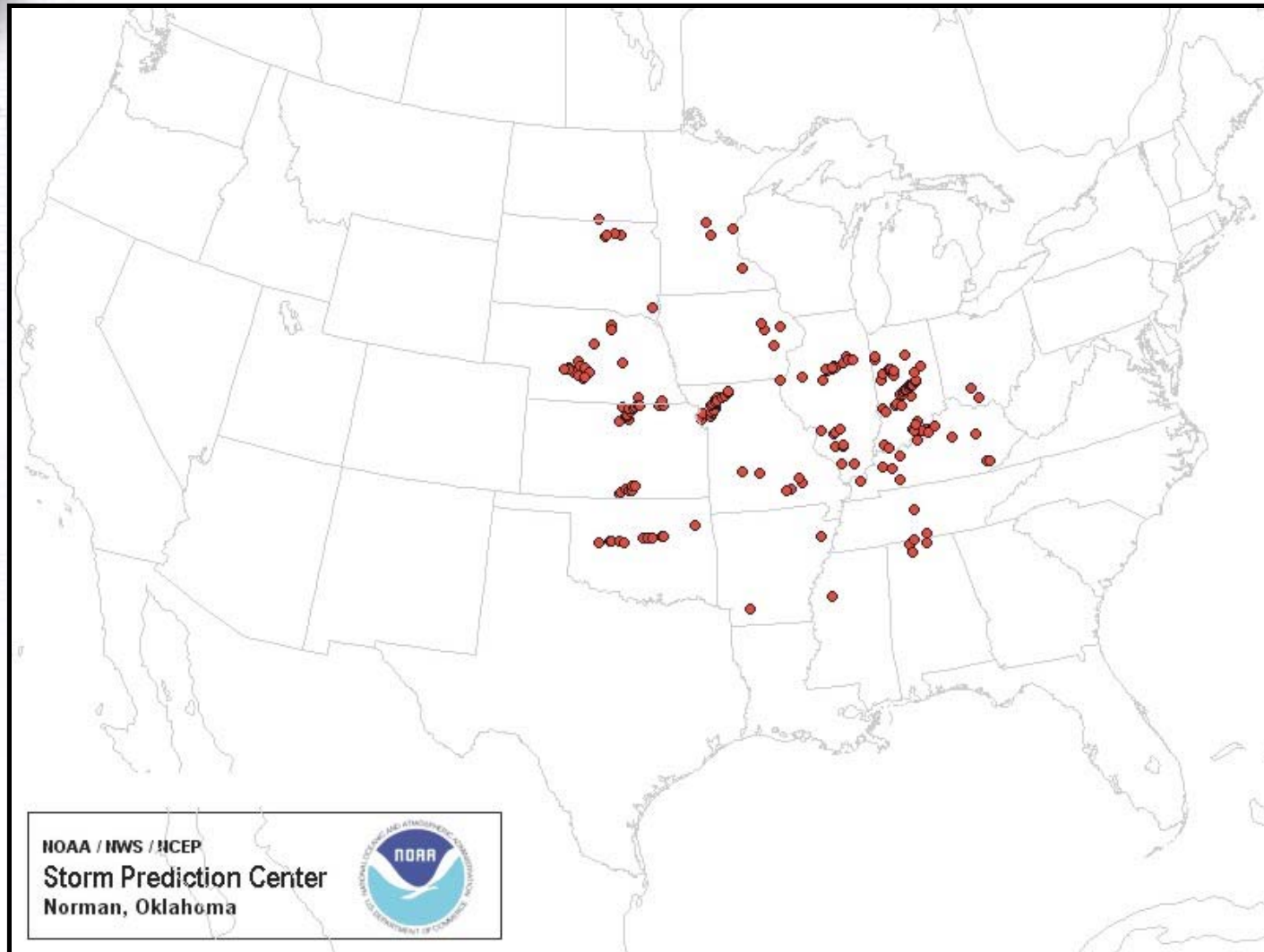


# **May 29-30 Outbreak**

Tornadoes from the Plains into the Ohio  
and Tennessee Valley



# 149 tornado reports







# Like the Super Outbreak in '74?

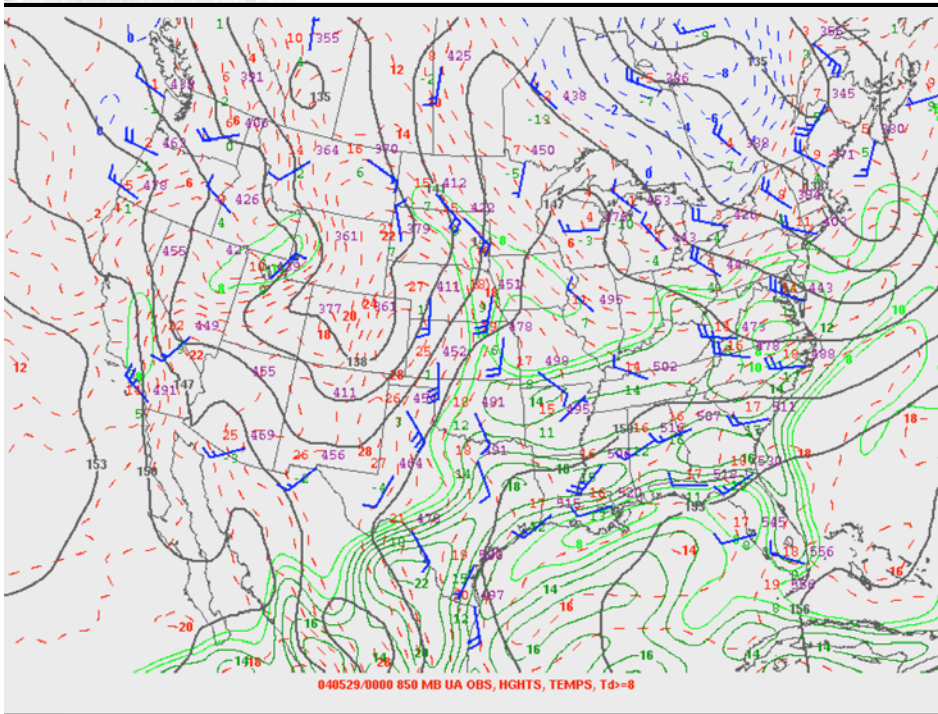
---

- No tornadoes rated with F5 damage
  - April 3-4 had 6
- Happened in a 32 hour period
  - April 3-4 was in 16 hours
- 82 tornadoes were rated F0
- Five fatalities
  - April 3-4 had 315 fatalities

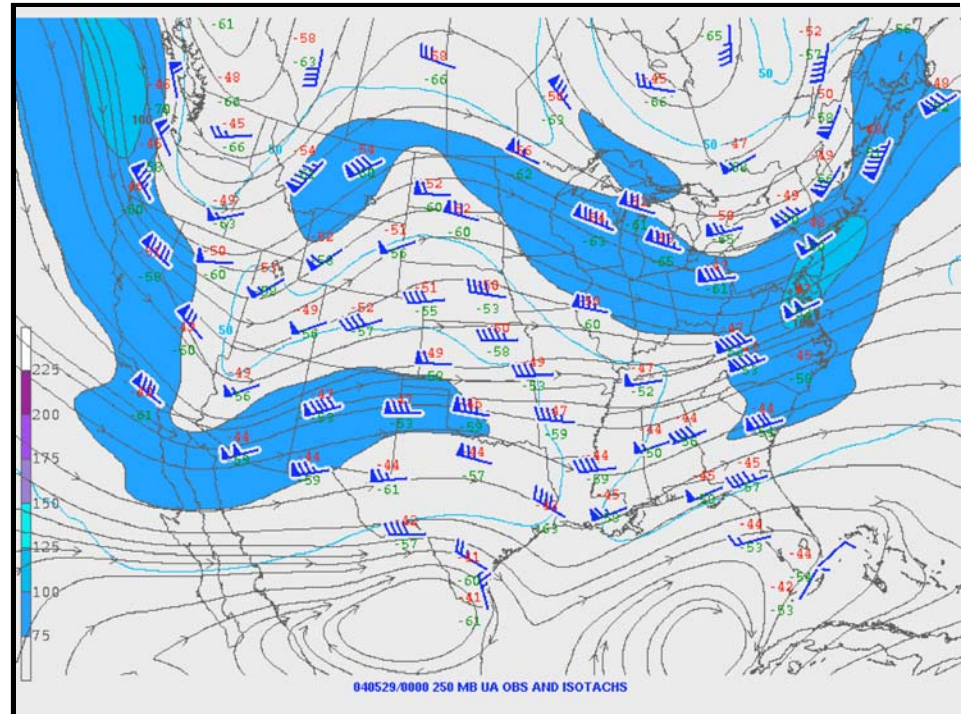




# May 29<sup>th</sup> at 00 UTC



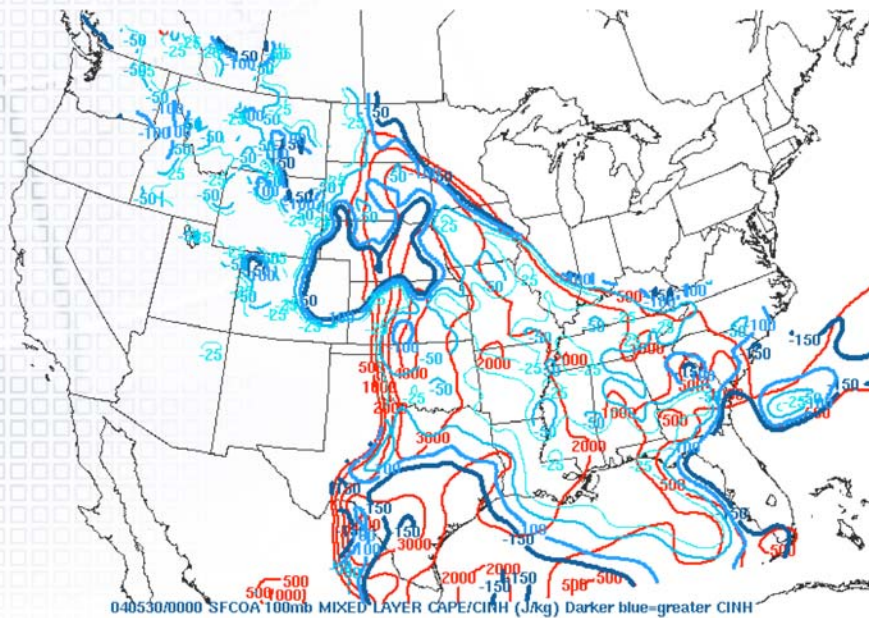
850 mb



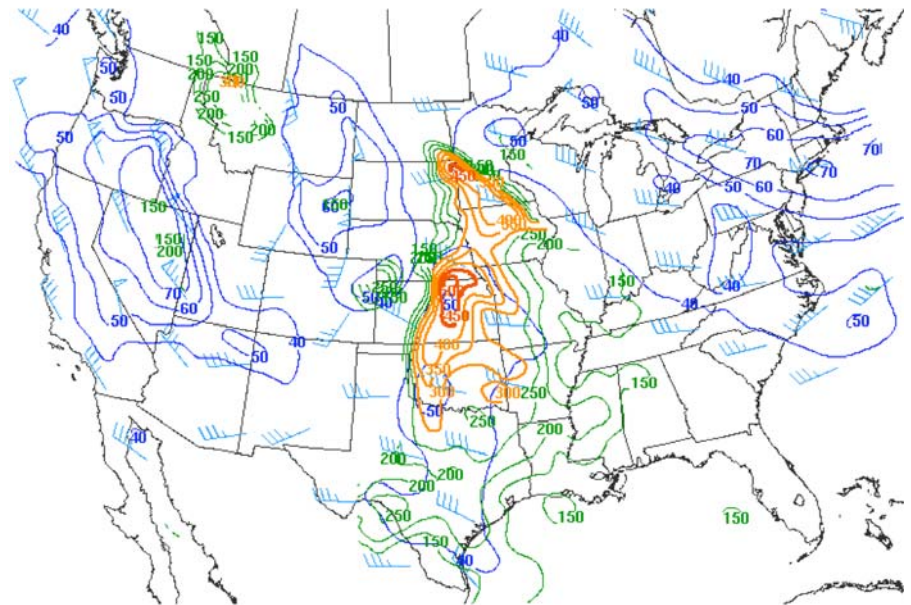
250 mb



# Thermodynamics-040530 at 00 UTC



040530/0000 SFCOA 100mb MIXED LAYER CAPE/CINH (J/kg) Darker blue=greater CINH

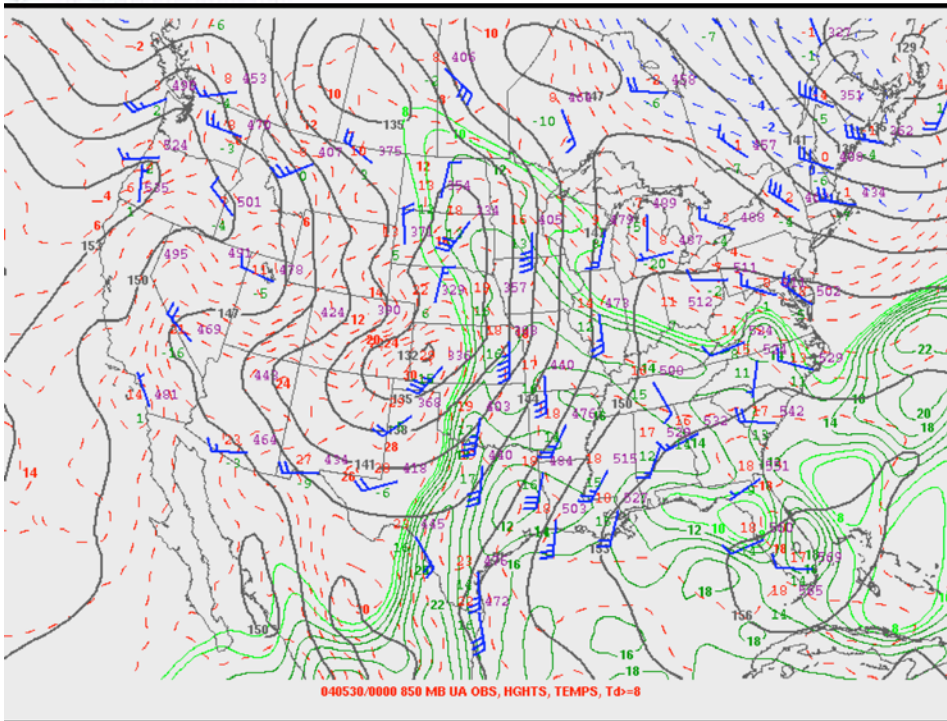


040530/0000 SFCOA BLYR-6km SHEAR (kt, blue) and EFFECTIVE HLCY (m2/s2)

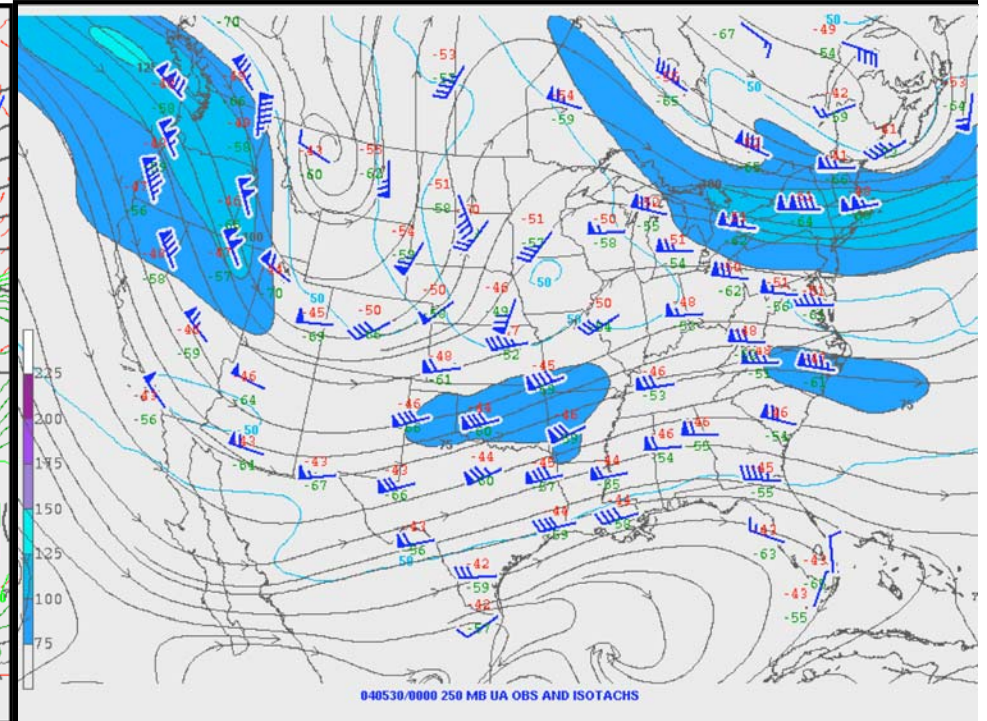




# May 30<sup>th</sup> at 00 UTC



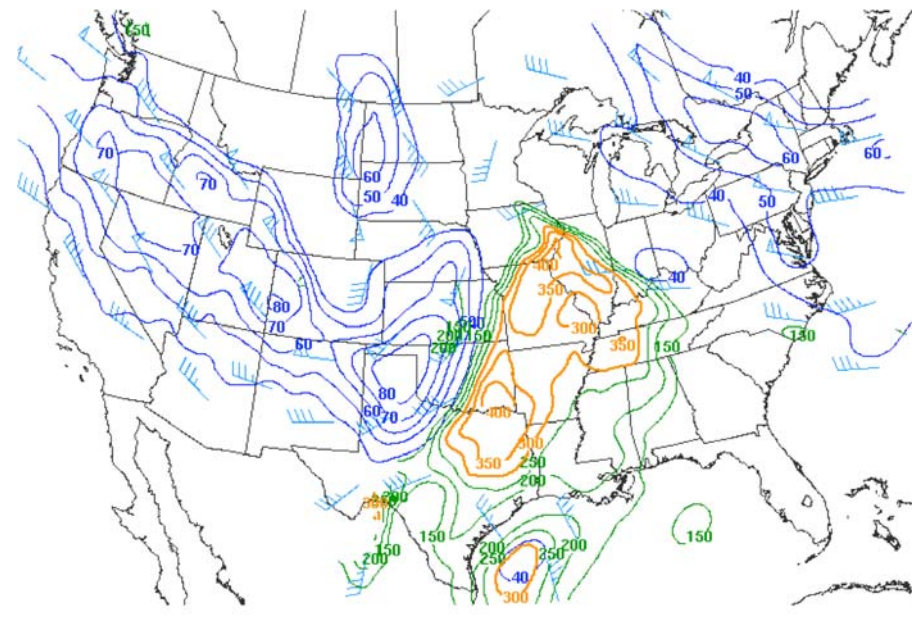
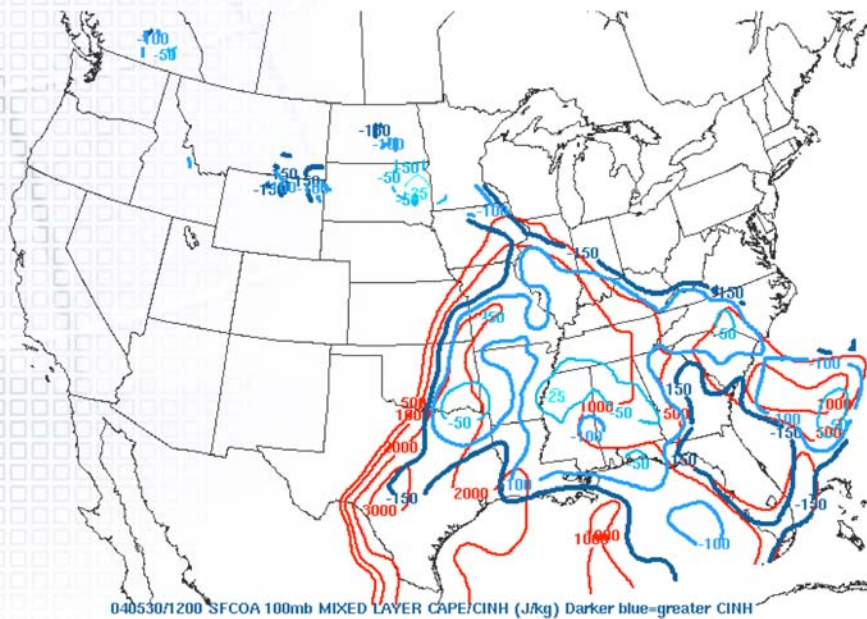
850 mb



500 mb



# Thermodynamics - 040530 12 UTC





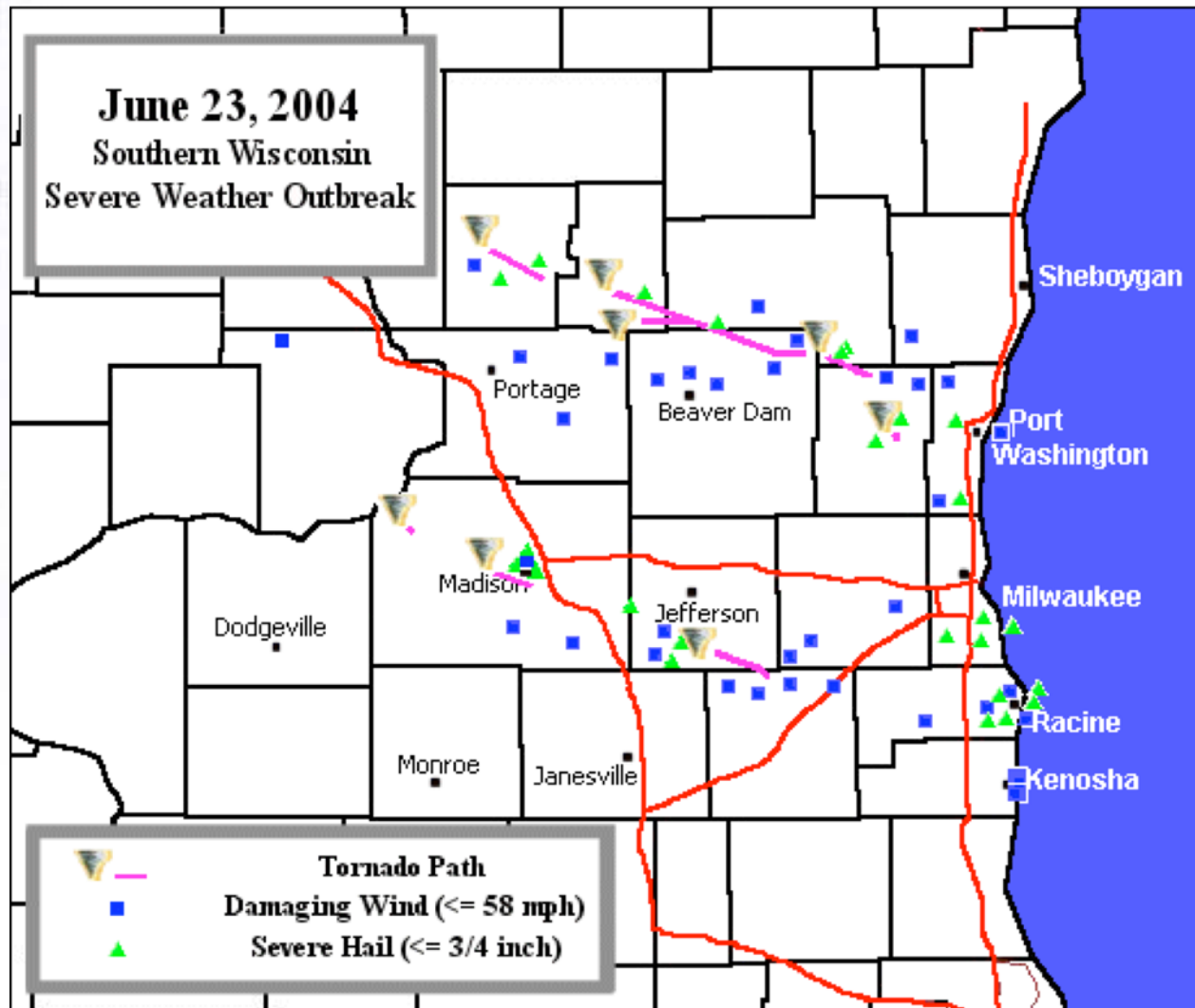


# June 23rd

## Markesan, WI



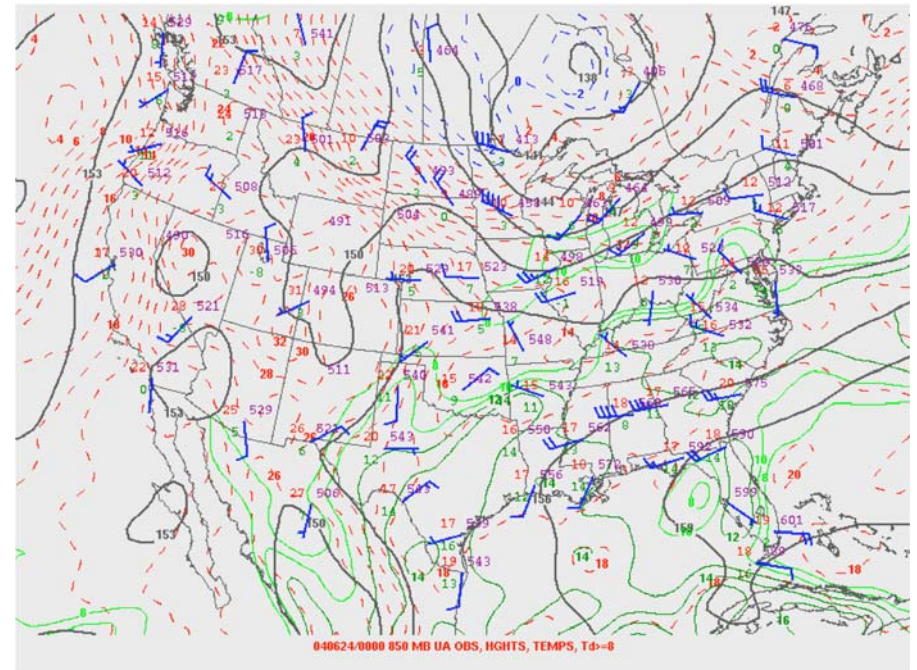
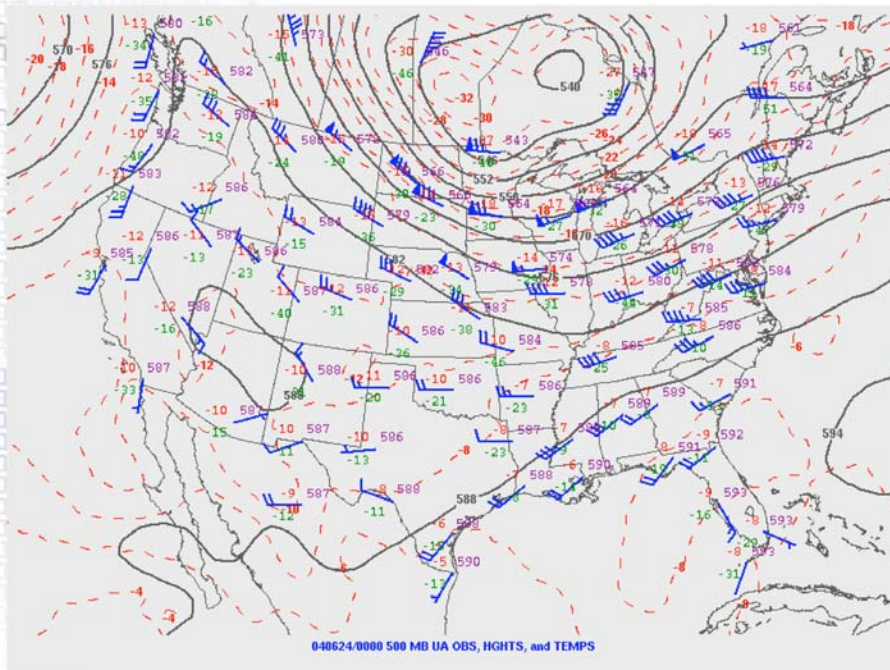
# Northwest Flow Case







# Meteorology



3/10/05

2005 National Severe Weather  
Workshop

33



# Madison, WI



3/10/05



2005 National Severe Weather  
Workshop

34





# Markesan, WI



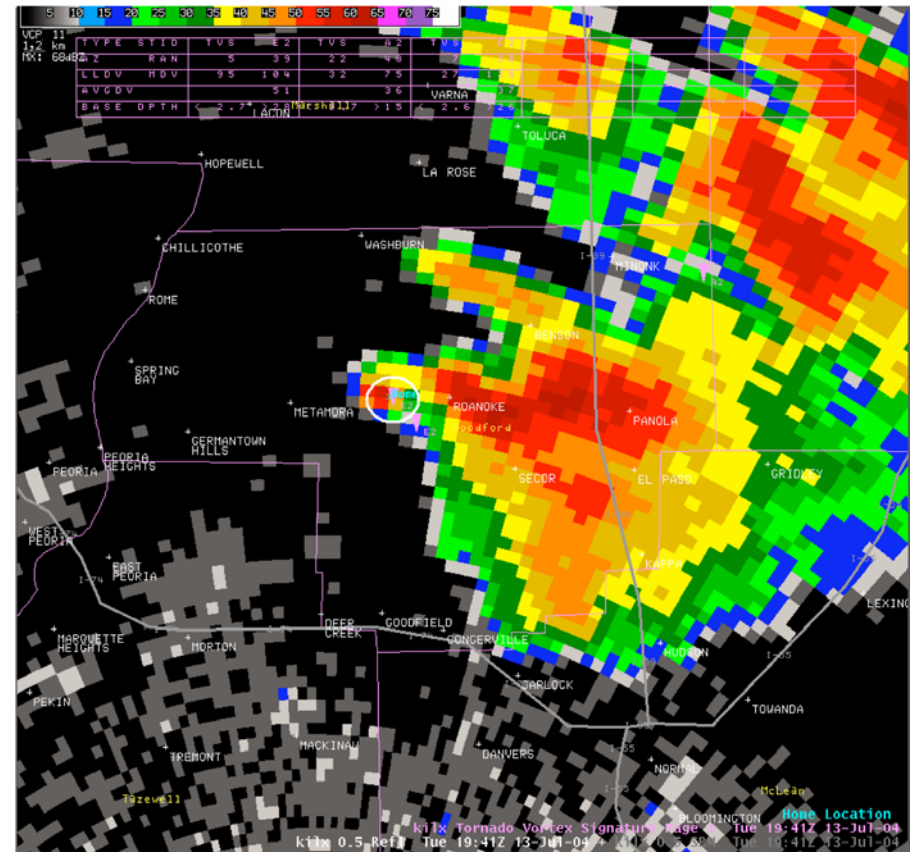


# July 13th

Metamora, IL  
Another Northwest Flow Case



# A Real Success Story!



3/10/05

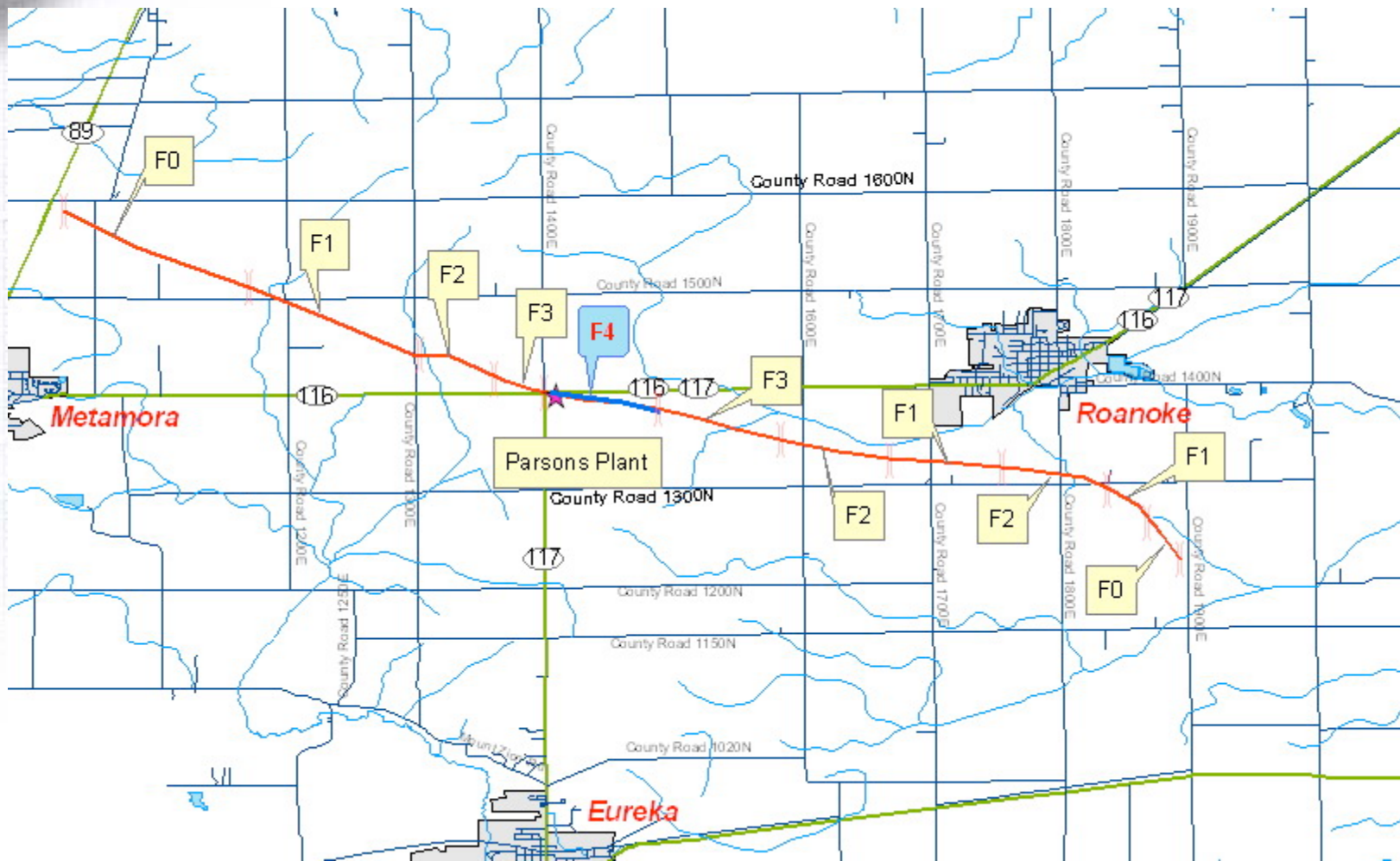
2005 National Severe Weather  
Workshop

37





# Tornado Track





# No Fatalities...They were Ready

---





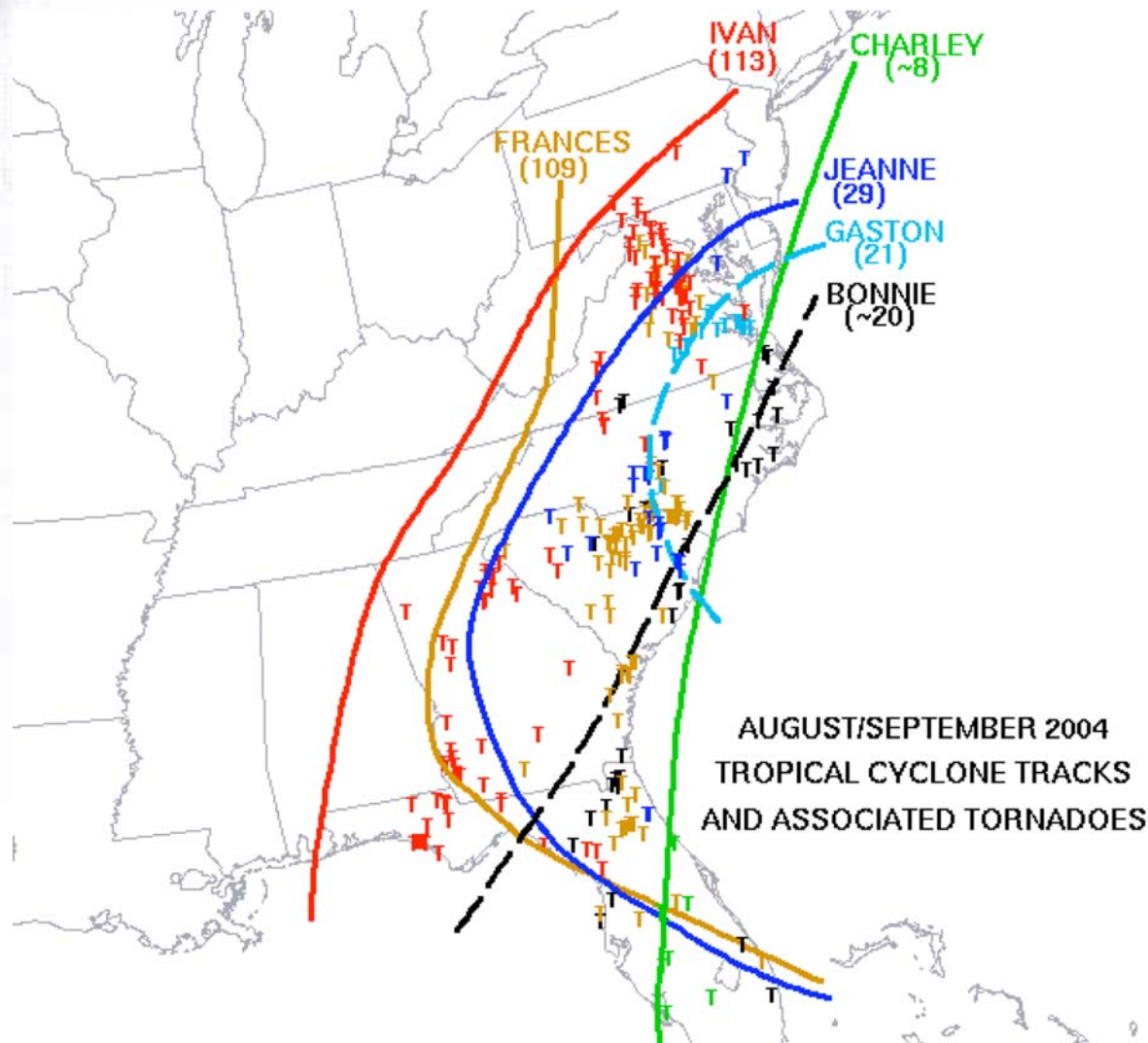
# **Hurricane Related Tornadoes**

**Six Tropical Systems =  
306 Reports**





# Estimated Tracks & Reports





# **Late November Outbreak**

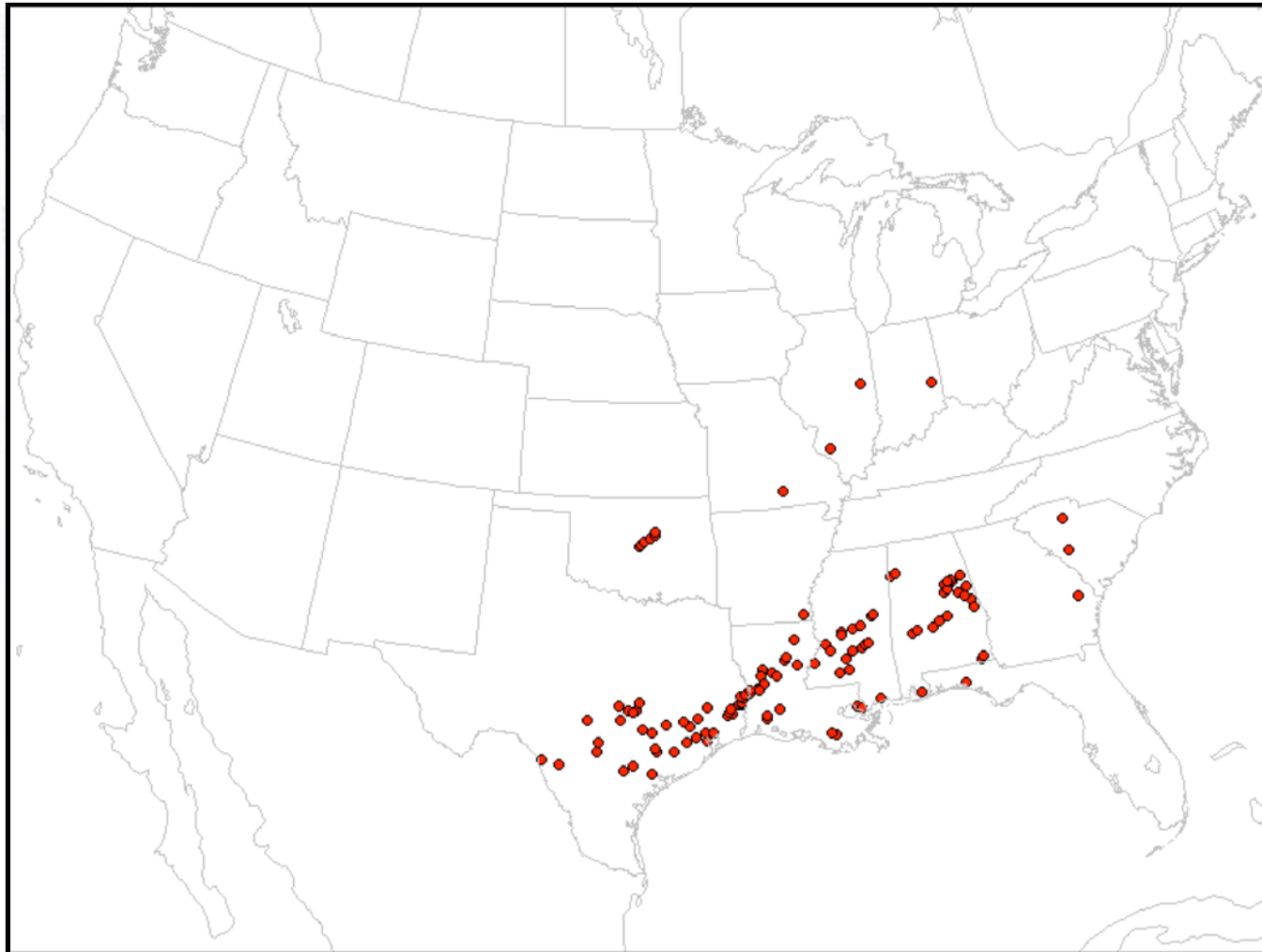
## **Dixie Alley Gets Hit**





# November Tornado Reports

---



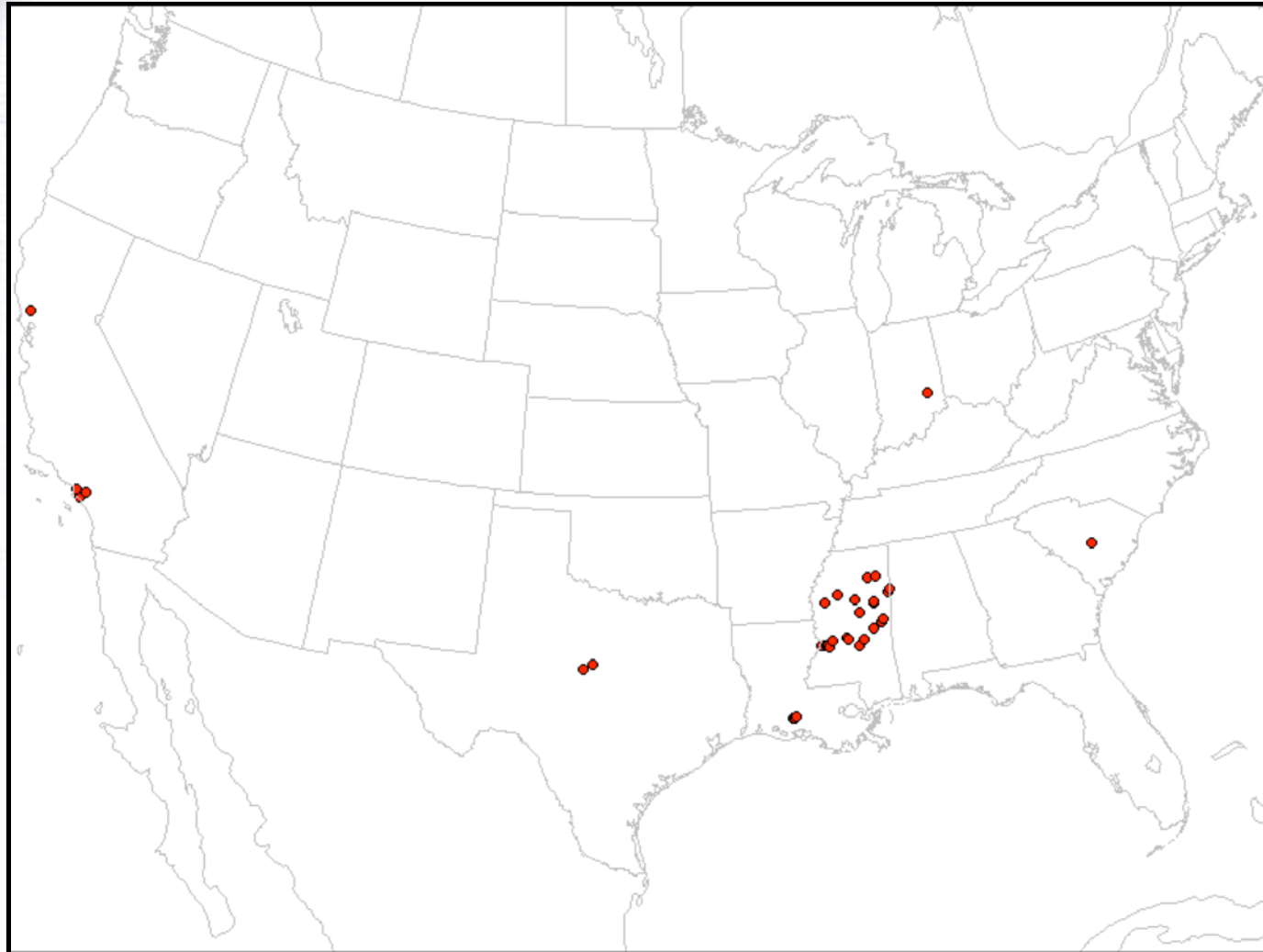


# One Last Round

December – Dixie Alley &  
Southern California



# December Tornado Reports





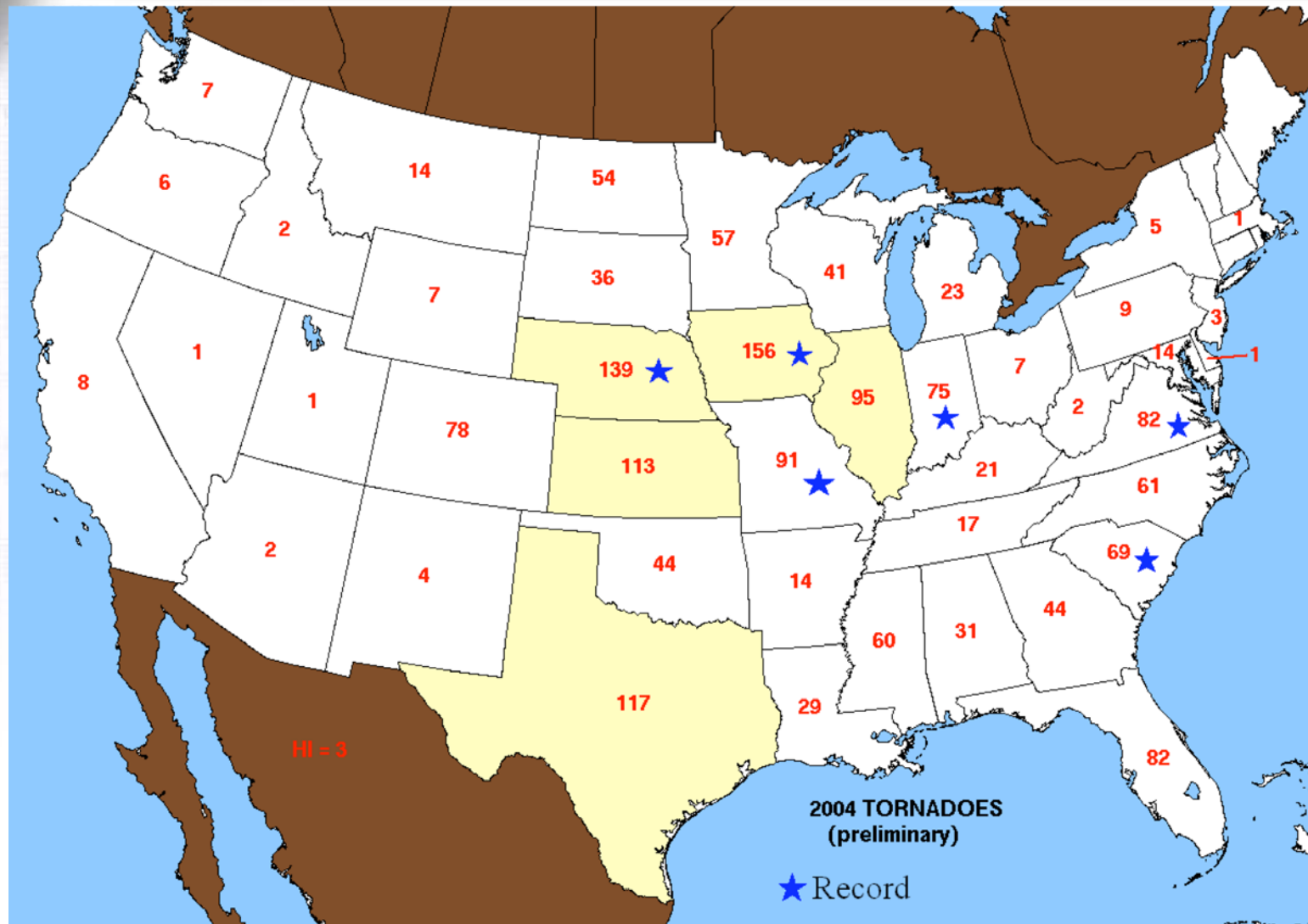
# In Summary

---

- Preliminary record number of tornadoes – **1,722**
  - Eclipses previous record of 1,424 in 1998
  - This is 72% more than normal
  - This is 44% above the 10-year average
- 36 tornado related fatalities
  - 20 killer tornadoes
  - 35% below average
- 159 tornado days
  - 22% below average



# 2004 Tornadoes By State

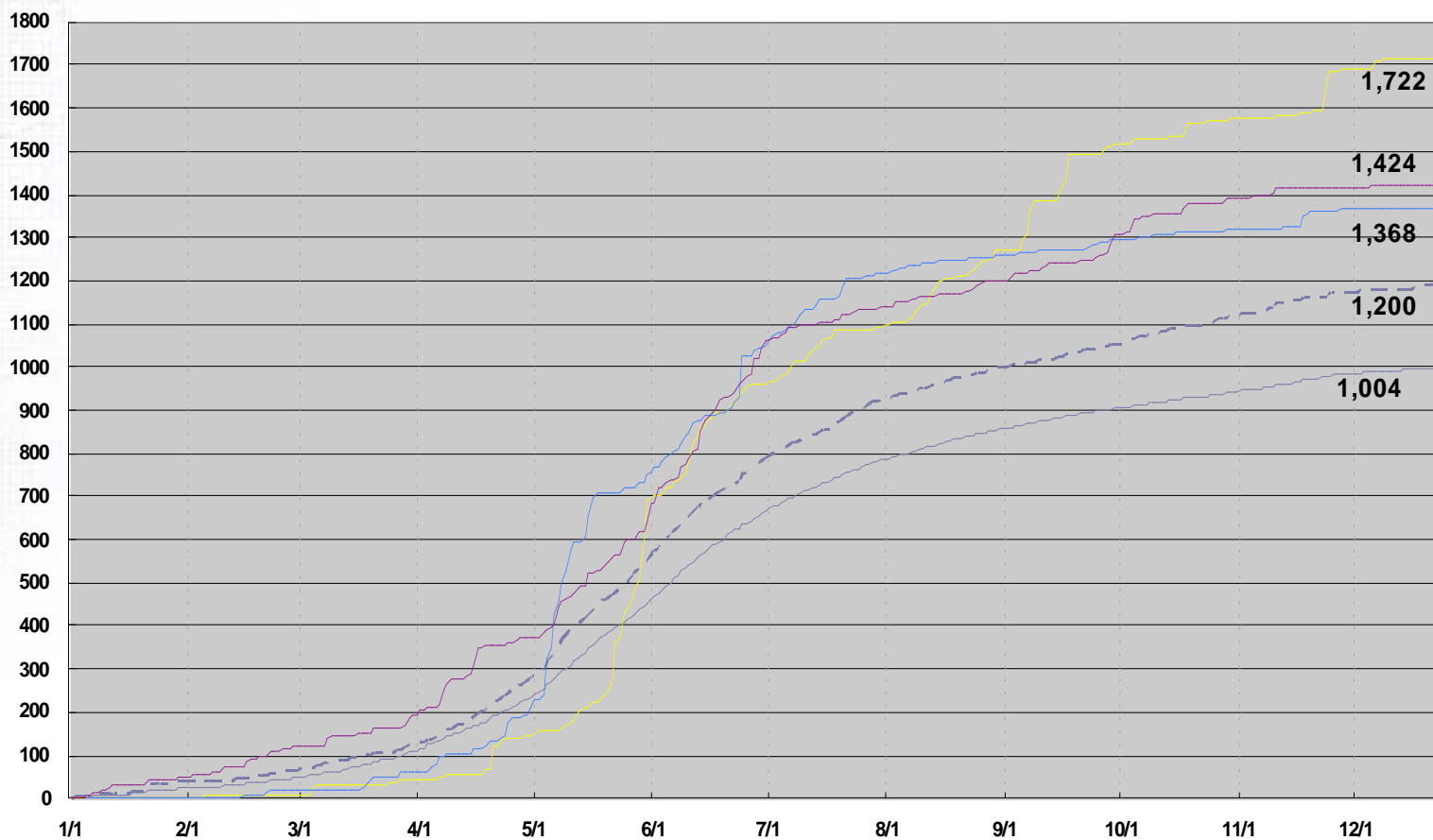






<http://www.spc.noaa.gov/climo/torn/monthlytornstats.html>

## 2004 Tornado Activity





# National Severe Weather Workshop

- March 3, 4, & 5 in Oklahoma City
- Reed Center
- Geared for Emergency Managers and Media
- Presentations on NWS products-Storm Spotter and Radar Training
- [www.norman.noaa.gov/nsww2005](http://www.norman.noaa.gov/nsww2005)



3/10/05



2005 National Severe Weather  
Workshop



49